As regards the technological examinations, Mr. Mangus said that four years ago the institute took over these examinations from the Society of Arts, which had previously conducted them under somewhat different conditions. The candidates have increased very much during these four years, especially those in mechanical trades. At the time of the transfer of the examinations, the number of candidates was 212, whereas this year, 1883, the number of candidates amounted to 2397.

The Council of the Institute are very desirous that scholarships should be established in connection with the Finsbury College and other similar technical Colleges throughout the kingdom, to enable promising pupils to carry on their education at the Central Institution. If children could be taught sufficient mathematics and elementary science to be transferred from the Board schools to the Finsbury College, or to some other technical school, and thence to the Central Institution, he considered the ladder of technical education would be complete.

He thought that the Board might further aid in assisting technical education by the loan of its rooms for the formation of evening classes, it being always understood that, in order that the instruction should be of any use, it must be of a practical character, and that the classes should be well furnished with all necessary models, apparatus, &c.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

MR. THOMAS PURDIE, Ph.D., B.Sc., Associate of the Royal School of Mines, has been appointed Professor of Chemistry in the University of St. Andrews, vacant by the retirement of Dr. Heddle.

SOCIETIES AND ACADEMIES

LONDON

Linnean Society, December 4, 1884.—William Carruthers, F.R.S., Vice-President, in the chair.—The following were elected Fellows of the Society:—The Hon. F. S. Dobson, W. A. Haswell, Geo. W. Oldfield, Dr. G. W. Parker, M. C. Potter, T. J. Symonds, W. A. Talbot, and J. H. Tompson.—Mr. W. T. Thiselton Dyer exhibited:—(1) Examples of leaves of *Sagittaria montevidensis* under different modes of cultivation, the changes thus induced as regards size and general facies being most remarkable, so much so that they might be deemed widely separate genera. The small leaves were from a plant raised from seeds collected in Chili by Mr. J. Ball, F.R.S., and sent to Kew in 1883, and grown in a pot half submerged in the *Nymphæa* tank. The enormously large leaf and spike were those of a plant raised from seeds, ripened at Kew, and sown in spring (1884). When strong enough the plant was planted in a bed of muddy soil, kept saturated by means of a pipe running from the bed to the *Nymphæa* tank. (2) A special and peculiar instrument called a "Ladanisterion," from Crete, it being a kind of double rake with leathern thongs instead of teeth, and used in the collecting of gum Labdanum, a drug now dropped out of modern pharmacy. The instrument in question was procured for the Kew Museum by Mr. Sandwith, H.M. Consul in Crete. (3) A collection of marine Algæ from West Australia, brought to this country by Lady Broome.—A paper was read by Dr. Francis Day on the relationship of Indian and African fresh-water fish-fauna. In this communication the author refers to certain papers of his, read before the Society on previous occasions, but he more particularly deals with the differences shown between his own statements therein and those subsequently given by Dr. Günther in his "Introduction to the Study of Fishes." Dr. Day is inclined to believe that in the consideration of Indian fish distribution there seems a possibility that certain marine forms, for example, the Acanthopterygian *Lates*, the Siluroid family Arünæ, and others have been included among the fresh-water fauna by Dr. Günther, whereas fresh-water genera, such as *Ambassis*, several genera of the Gobies, *Sicydium*, *Gobius*, *Eleoteris*, &c., have been omitted from the fresh-water fauna of India by Dr. Günther. Thus Dr. Day attempts to show that there may be less affinity between the African and Indian regions, so far as fresh-water fishes are concerned, than there is between his restricted Indian region and that of the Malay Archipelago. He adds that of 87 genera found in India, Ceylon, and Burmah, 14 extend to Africa, 44 to the Malay Archipelago, whereas out of 369 species only 4 extend to Africa and 29 to the Malay Archipelago.—On the growth of trees and protoplasmic continuity, was a paper by Mr. A. Tylor, giving his experiments in the curvature assumed by branches, particularly those of the horse-chestnut. He pointed out that the terminal bud is constantly directed upward, but is straightened out at a later stage of growth. Further, he found that terminal buds, when directed by being tied against a tree-trunk or plank, invariably turned away from the obstruction irrespective of the incidence of light. When the growing points of neighbouring branches were turned directly towards each other, they mutually turned aside or one stopped growth. Some co-ordinating system was necessary to enable the parts to act in concert, and he attributes this to a continuity of the threads of protoplasm.—A paper was read on *Heterolepidotus grandis*, a fossil fish from the Lias, by James W. Davis. The author describes the specialities of this form, and remarks that the genus had been instituted by Sir Philip Egerton for certain forms closely related to Lepidotus, but differing in their dentition and scaly armature. The *H. grandis* has interest, among other things, in the attachment of the dorsal and anal fins with the series of well-developed interspinous bones, in the peculiar arrangement of the articular apparatus of the pectoral fins, and in the heterocercal form of the tail.

Chemical Society, December 18, 1884.—Dr. Russell, F.R.S., in the chair.—The following gentlemen were elected Fellows:—W. P. Ashe, Sir B. V. S. Brodie, Bart., J. F. Ballard, W. Briggs, M. T. Buchanan, W. G. Brown, H. M. Chapman, W. H. Eley, J. Frost, T. P. Hall, H. J. Hodges, H. Jackson, F. Johnson, J. D. Johnstone, G. F. Kendall, C. W. Low, F. M. Mercer, P. C. Porter, V. E. Perez, A. Rickard, K. B. B. Sorabji, R. B. Steele, H. Smith, E. G. Smith, G. Thorn, W. Tate, P. C. Thomas, T. Wilton, J. H. Worrall, W. C. Wise, W. H. Wood.—The following paper was read:—Chemico-physiological investigations on the cephalopod liver and its identity as a true pancreas, by A. B. Griffiths. The author could not detect any bile acids or glycogen in this organ, but a ferment obtained from it by glycerine converted starch paste into sugar, and formed from fibrin, obtained from the muscular fibres of a young mouse, leucin and tyrosin, the latter body giving, with a neutral solution of mercuric nitrate, a red precipitate. It was announced that at the next meeting, January 15, Prof. Thorpe would read a paper on the atomic weight of titanium, and that Dr. Frankland would give a lecture in February on chemical changes produced by micro-organisms.

Royal Microscopical Society, December 10, 1884.—Rev. Dr. Dallinger, F.R.S., President, in the chair.—Mr. Crisp exhibited Dr. Cox's radial microscope, a simplified form of Mr. Wenham's stand.—Mr. J. Mayall, jun., exhibited a new stage which he had devised, in which the thin upper plate was abolished and a frame to hold the slide substituted, which is not liable to flexure.—Mr. Crisp also exhibited Ward's eye-shade, Bausch's adapter for a spot lens, and Kain's mechanical finger.—Mr. Rosseter's paper on the gizzard of the larva of *Corethra plumicornis* and its uses, and one of Mr. G. F. Dowdeswell, on variations in the development of a Saccharomyces, were read and discussed.—A communication was read from Dr. Cox, the President of the American Society of Microscopists, expressing scepticism as to the possibility of making sections of diatoms so thin as those claimed by Dr. Flögel, as recently published in the Society's *Transactions*.—Mr. Parsons exhibited the hydroid form of *Limnocodium Sowerbii*, the fresh-water Medusa which he had found in April last at the Botanic Gardens, Regent's Park.—Dr. Zenger's method of mounting diatoms so as to show both sides was explained, and some mounts exhibited.—Mr. Cheshire gave a *résumé* of his paper on some new points in the anatomy of the bee. It has long been known that the queen bee, in common with many insects, stores the spermatozoa she receives from the male in a small sac, which is called the spermatheca. A long chain of evidence has also satisfied entomologists that in some way these spermatozoa are transferred to those eggs which are to be converted into undeveloped females known as workers, but the manner of this fertilisation has not hitherto been demonstrated. By carefully dissecting out a spermatheca with its attachment to the oviduct unbroken, and then by needle-knives cutting through the trachea which incloses it completely, the spermatheca and its valve may be isolated. It is then seen to be accompanied by a long double gland having a centrally-placed duct, provided with a sphincter muscle near its junction with the aperture of the spermatheca. The spermatheca itself carries a sphincter and three muscles, two to aid and

one to antagonise its action. The glandular secretion acts as a vehicle for carrying the spermatozoa, as liberated, towards the oviduct. Another gland, previously unknown, now adds its secretion, and serves to bring the spermatozoa into proper separation from each other. The common oviduct is not a simple tube, as formerly supposed, but carries in its centre a pouch of delicate membrane, and very like the recurved tail of a lobster. Two muscles, having for their especial purpose the direction of the egg in transit to the ovipositor, carry the egg, if a worker is to be produced, into this central pouch, and bring it into contact with the spermatic fluid, when a spermatozoon enters its micropyle. If a drone or male is to be produced, it takes a lower path in the right or left oviduct, and a side path to the ovipositor, and so avoids the pouch and escapes fertilisation. Siebold's theory of parthenogenesis in the bee is thus anatomically demonstrated to be accurate.—Dr. Van Heurck's paper on the resolution of *Amphipleura* into "beads" was read, and gave rise to a long discussion.—The meeting resolved to send a contribution to the memorial now being raised in America to the late R. B. Tolles, the eminent optician.

Royal Meteorological Society, Dec. 17, 1884.—Mr. R. H. Scott, F.R.S., President, in the chair.—Mr. C. H. Cotton, Mr. S. A. Jolly, L.R.C.P., and Rev. C. J. Taylor, M.A., were elected Fellows of the Society.—The following papers were read:—On the reduction of temperature means for short series of observations to the equivalents of longer periods, by Dr. Julius Hann, Hon.Mem.R.Met.Soc. The author has recently carried out an investigation into the climate of the Alpine districts of Austria, and in doing so he has endeavoured to reduce the monthly and annual means of all the temperature observations from the districts in question during the interval from 1848 to 1880, and in some places to 1884, to the mean for the thirty years' period 1851 to 1880. In this paper Dr. Hann describes the methods he adopted to reduce observations at mountain stations for short periods to the equivalents of longer periods.—The diversity of scales for registering the force of wind, by Charles Harding, F.R.Met.Soc. The object of this paper is to call attention to the confusion that exists in the systems in use by various countries for registering wind-force, whether instrumentally or otherwise, and to show the need of action for improvement.—Report on the phenological observations for the year 1884, by the Rev. T. A. Preston, M.A., F.R.Met.Soc. The salient features of the weather during the period embraced in this report, viz. October 1883 to September 1884, were: the mild winter, the cold April, the hot August, and the long period of drought, which at the end of September began to be seriously felt. The general effects on vegetation have been: the prolonged existence of many of the autumn species, the great loss of wall-fruit, the failure of bush fruits, the plentiful supply of strawberries as long as they lasted, but the time was short; the good hay harvest, although it was light in quantity; the good corn crop, the unusually plentiful potato crop, and the great abundance of wild fruits.

EDINBURGH

Royal Society, December 15, 1884.—Mr. Robert Gray, Vice-President, in the chair.—Dr. Sang read the first part of a paper on the theory of the tides.—Mr. J. T. Cunningham gave a communication on the nature and significance of the structure known as Kupffer's vesicle in teleostean embryos.—Prof. Turner discussed the relation of the alveolar form of cleft palate to the incisor teeth and the intermaxillary bones.—Mr. T. Andrews, F.C.S., gave a paper on the apparent lines of force on passing a current through water.

Royal Physical Society, Dec. 17, 1884.—B. N. Peach, F.R.S.E., F.G.S., President, in the chair.—The following communications were read:—On *Loligopsis* and allied genera, by W. E. Hoyle, M.A. (Oxon), F.R.S.E., &c. The author reviewed all the species which have at various times been referred to the genus *Loligopsis*, and indicated the different genera to which they should be relegated; the genera *Leachia*, Lesueur, and *Taonius*, Steenstrup, were fully characterised; *Desmoteuthis*, Verrill, was considered, and shown to be synonymous with *Taonius*.—Mr. Hoyle also exhibited, with remarks, a specimen of *Strongylus contortus* (Rud.).—Mr. J. R. Henderson, M.B., of the Scottish Marine Station, Granton, read a communication on additions to the fauna of the Firth of Forth. Specimens were exhibited of forty-five species new to the district, including the following:—*Astrorhiza limicola*, *Halecium* sp. (probably new), *Ascandra variabilis*, *Tomopteris* sp., *Nymphon hirtum*, *Corophium tenuicorne*, *Nyctiphanes* (*Thysanophoda*) *Norvegica*, and *Podopsis Slabberi* (new to Britain).—Mr. F. G. Pearcey explained a method of hardening friable and decomposed rocks, sands, clays, &c., so that sections may be made of them for microscopical purposes. During the cruise of the *Challenger*, he said, there was obtained a large collection of oceanic deposits, whose structure could not be accurately determined without making transparent sections. On account of their extreme friability this was found impossible by the usual methods, and it was therefore necessary to find a mode of rendering them hard and compact. After many experiments and much labour, a method was devised which had proved successful, and which would be found of great service to mineralogists, geologists, and others, in the investigation of soft rocks. It consisted in the introduction of a foreign substance to cement the grains together, and so render the material capable of being cut into sections. The substance used for this purpose was a solution of gum copal in ether, the ether being evaporated after the material had been soaked in the preparation, and the residuum carefully dried. Mr. Pearcey minutely described the various processes to be followed, and exhibited specimens illustrative of the results obtained. Mr. Hoyle spoke of the necessity of having mud and ooze examined by the polariscope, and bore testimony to the value of the method of doing this, which was due to Mr. Pearcey's patience and perseverance.—A note on the breeding of the Marsh Tit (*Parus palustris*, L.) in Stirlingshire during the present year (1884), with exhibition of nest and eggs, was read by Mr. William Evans, F.R.S.E.—On abnormal dentition in a Dingo (*Canis dingo*), specimen exhibited, by Andrew Wilson, L.D.S.—Mr. A. Gray exhibited, with remarks, a live specimen of the Water Spider (*Argyroneta aquatica*) from Luffness Marshes.

DUBLIN

Royal Society, Nov. 17, 1884.—Section of Physical and Experimental Science.—Prof. J. Emerson Reynolds, F.R.S., in the chair.—After an introductory address by the chairman the following communications were read:—Notes on the aspect of the planet Mars in 1884, by Otto Boeddicker, Ph.D., communicated by the Earl of Rosse, F.R.S. The notes are accompanied by thirteen drawings of the planet, representing the following longitudes of Mars' central meridian:—(1) 12°·6 (March 23), (2) 24°·9, (3) 28°·3 (March 22), (4) 38°·0 (March 23), (5) 73°·0 (March 17), (6) 137°·8 (March 10), (7) 261°·8, (8) 267°·4 (April 2), (9) 279°·4 (April 1), (10) 286°·7, (11) 303°·2 (February 24), (12) 307°·6 (April 1), (13) 317°·4 (February 24). When compared with Schiaparelli's charts they admit of the identification of the following spots:—*South:* Sabæus Sinus, Deucalionis Regio, Thymiamata, Margaritifer Sinus, Auroræ Sinus, Mare Cimmerium, Hesperia, Syrtis Minor, Syrtis Major, and a trace of Œnotria or Japygia; *North:* Lacus Niliacus, Nilus, Alcyonius Sinus, Astapus; on the *disk-middle* traces of these canals: Gehon, Indus, Hydaspes, Ganges, Cyclopum, Phison, Euphrates. Sketches Nos. 1 to 4 show when the markings in longitude 10° lie on the disk-middle, the sp–nf direction of Deucalionis Regio, but when they lie near the preceding limb the sf–np direction of Thymiamata prevails so considerably that the angular shape of the two Sinus Sabæus and Margaritifer may be entirely overlooked, and only the one or the other direction perceived and ascribed to them. Lacus Niliacus is seen interrupted on Nos. 1 and 4, so as to resemble its appearance on Schiaparelli's chart of 1882; and Nilus is seen double on No. 13—which makes it probable that a trace of Schiaparelli's gemination of lines was perceived at Birr Castle. During the time between Nos. 7 and 8, Syrtis Minor became much darker, and Syrtis Major became visible; this, as it cannot be due to the planet's rotation, is probably due to changes in its own atmosphere. Alcyonius Sinus appeared much darker than either in 1879 or 1881. Sketch No. 5, which at time of drawing was considered difficult but fairly good, does not show any spots capable of certain identification. A comparison with other drawings of the same period may explain this.—On the volatilisation of zinc from German silver alloys at high temperatures, by A. R. Haslam; communicated by Prof. C. R. Tichborne. Alloys of known composition were heated in a current of hydrogen, and weighings taken at intervals of one hour. The chief loss in weight was found to take place in the first hour, and the loss was greatest in the alloys that were poor in nickel. The author concludes that nickel has the effect of retarding the volatilisation of the zinc.—On the analogy between heat and electricity, by Prof. G. F. Fitzgerald, F.R.S. It was

pointed out that the analogy, as usually drawn between heat and electricity, namely, to liken temperature to potential and quantity of heat to quantity of electricity, is not the true analogy, inasmuch as the product of temperature and quantity of heat is not of the nature of energy, and that the true analogue of quantity of electricity is quantity of entropy. In this case a non-conductor of electricity is a non-conductor of entropy, *i.e.* a non-conductor of heat. As the quantity of electricity is the same at all parts of a circuit, and as it requires a perfect heat-engine to transfer entropy from one temperature to another undiminished, conductors must be of the nature of perfect heat-engines. It was further pointed out that a molecular structure of ether similar to that of a gas could be assumed, the motions of whose molecules might be polarised in such a way by differences of temperature that, although no heat was conducted, it would be thrown into a state of stress which would explain electrostatic phenomena. It was explained that this was a step beyond that made by Maxwell in his "Electricity and Magnetism," where he avoids any hypothesis as to how electric displacement produces mechanical stress. The author stated, however, that the object of this communication was not to bring forward this doubtful hypothesis, but, by drawing attention to this analogy between heat and electricity, to prevent the danger at present imminent of its being supposed that the analogy between electric displacements and the motions of an incompressible fluid is the only analogy possible, and of this mere analogy being consequently mistaken for a likeness.—Howard Grubb, F.R.S., exhibited a star map photographed by the Rev. T. E. Espin.

Natural Science Section.—V. Ball, F.R.S., in the chair.—On a new species of *Halcampa*. This is the first recorded example of the genus in Ireland, and it proves to be a new species, for which the name *H. Andresii* is proposed. It was found at Malahide, Co. Dublin.—Mr. G. Y. Dixon exhibited a living and some preserved specimens of *Peachia hastata* from Dollymount Strand, Dublin Bay. This is the first Irish locality.—The Chairman exhibited geological maps of Canada and of the United States, with specimens of Laurentian rocks and minerals.

PARIS

Academy of Sciences, December 22, 1884.—M. Rolland, President, in the chair.—On a new method of measuring the heat of combustion of carbon and organic compounds, by MM. Berthelot and Vieille. The present paper is limited to the determination of the heat of combustion for cellulose (coton) and the various carbons used in the manufacture of gunpowder.—Description of a microscopic element by means of which it may be possible to determine the various groups of Cynthiadæ, by M. de Lacaze-Duthiers.—Remarks on the "Cours d'exploitation des Mines," presented to the Academy by M. Haton de la Goupillière.—Remarks on the volume of the *Connaissaance des Temps pour* 1886 and the *Annuaire pour* 1885, presented to the Academy in the name of the Bureau of Longitudes by M. Faye.—Note on the indeterminate equation

$$x^2 - Ky^2 = z^n,$$

by M. Maurice d'Ocagne.—On the thermodynamic potential and the theory of the voltaic pile, by M. P. Duhem.—Description of a diffusion photometer, by M. A. Crova.—Note on the heat of combustion of the ethers of some acids of the fatty series, by M. W. Louguinine. The author's experiments lead to the general conclusion that the heat of combustion of an acid is perceptibly equal to that of the ether of the same acid, less the heat of combustion of the corresponding alcohol, regard being had to the number of molecules of alcohol in reaction.—Note on the α-ethylamidopropionic acid, by M. E. Duvillier.—Observations on the optic activity of cellulose in connection with M. Béchamp's recent communication, by M. Alf. Levallois —On the cutaneous anæsthetic action of the hydrochlorate of cocaïne, by M. J. Grasset. It is shown that the hypodermic injection of 0·01 gr. of the hydrochlorate of cocaïne produces in man a sharply limited zone of cutaneous anæsthesis without general phenomena, and with slight local consequences, although lasting long enough to perform a certain number of surgical operations.—Influence of the variations in the centesimal composition of the air on the intensity of the respiratory functions, by M. L. Frédéricq.—On the spinal bone in the series of vertebrate animals, by M. A. Lavocat.—Note on the constitution of the reticulate rhizopods, by M. de Folin.—On the Acari dwelling in the quill of birds' feathers, by M. E. L. Trouessart.—On the existence of phanerogamous Asterophyllites, by MM. B. Renault and R. Zeiller.—On the Kersanton formation in the Croisic district, Loire Inférieure, by M. Stan. Meunier.—On a phenomenon of crystallogeny in connection with the fluorine of the Cornet rock near Pontigabaud, Puy-de-Dôme, by M. F. Gonnard —Results of the analysis of the masses of boiled beetroot, made with a view to determining the quantity of chloride of potassium and nitrate of potassium contained in it, communicated by M. H. Lepley. The quantity of these salts in 100 kilogrammes of root was found to be :—

	Max. [Gr.	Min. Gr.	Mean. Gr.
Nitrate of potassium	342	43	131
Chloride of potassium	217	65	143

BERLIN

Physical Society, Nov. 21, 1884.—Prof. Neesen reported on a case of magnetisation produced by a stroke of lightning, the distribution of which had been examined by a former pupil of the speaker. The lightning had struck the clock of a church tower, and so strongly magnetised it that it was only by great force that the pendulum could be moved from its position of rest, while the clock had to be taken to pieces and the magnetised iron parts demagnetised by means of heat. The most strongly-magnetic part was a U-shaped piece of cast-iron, the two perpendicular and downward-directed legs of which bore the edges for the pendulum. The distribution of the magnetism in this piece of iron was as follows :—Not far from the lower ends (at about a third of the height) was a neutral point on both sides, the inferior piece on one side being north polar, on the other side south polar. On the side having the north pole, south polar magnetism was found above the neutral point, extending above the middle line and beyond, so as to take in about the upper third of the other leg. Thereupon followed an upper neutral point, between which and the lower neutral point of this side was found north polar magnetism. The two lower neutral points were the spots where the two legs of the U-shaped piece of iron were connected by a horizontal iron pin. Other effects of the lightning were not to be found either in the clock or on the church tower.—Prof. Neesen further produced a galvano-plastic high relief of iron, of a dull silver-gray, which in fineness of detail far surpassed the productions of the silver galvano-plastic art. The method by which this was produced was still kept secret by the manufacturer.—Prof. Lampe communicated some interesting results arrived at by his pupils in exercises in calculation. One problem was to calculate the attraction of a homogeneous mass of certain form on a material point of its surface, if the attraction of the same mass in globular form on the pole was equal to 1. The calculation was first made for a flattened ellipsoid, in which the attraction on the polar point was known to be greater than 1. With increase of oblateness the attraction increased up to a maximum, for which the magnitude of the attraction and the eccentricity of the meridian curves were calculated. After this maximum the attraction abated, with further increase of oblateness, and the eccentricities of those meridian curves were calculated for which the attraction was equal to 1, as also of those for which it was equal to 0·5. Similar calculations were made for the elongated ellipsoid. In this case the attractions on the polar point became continually less, and only the eccentricity of the meridians was calculated, in which the attraction was equal to 0·5. Another exercise was to calculate the attraction of a circular cylinder on the middle point of a terminal plane, when the relation of the radius, r, of the terminal plane to the height, h, changed. In this case, too, with a certain relation of h to r a maximum of attraction was found, which was more than 1 but yet less than the maximum in the case of the flattened ellipsoid. After this maximum the attraction declined as well with increasing h as with increasing r, and the two relations of h to r, in which the attraction was equal to 1, were found. Finally, in the case of the circular cones, the attraction on the apex was calculated, and here, too, the maximum was determined, being, however, less than 1, and the cone was determined in which the attraction on the apex was equal to the attraction on the centre of the fundamental plane.—Prof. Landolt described a simple contrivance used by him for recovering the products of sublimation. A test tube, of glass in the case of bodies easy to sublime, of platinum in the case of bodies difficult to

sublime, was closed at the top by a stopper through which passed two small tubes, one reaching to the bottom, the other coming out below the stopper. The first small tube was connected with the condenser, and by this means the tube became permanently cooled. The cold tube was let down into the vessel in which the substance to be sublimed was being heated, and the products were obtained on the outside of the little tube, from which they could be easily removed. By a platinum tube in the platinum retort the speaker received molybdenous acid crystals, and, by the heating of lime, microscopic lime crystals.—Prof. Landolt further described an arrangement of a sodium lamp for a polarimetric apparatus in which a uniformly bright flame was produced, and he also showed a theodolite with a glass scale, which could be read by transmission of the incident light, thus facilitating observation.

Physiological Society, November 29, 1884.—Prof. Waldeyer exhibited a microscope-stand which he found very practicable, both for the ease and security with which it enabled a microscope to be turned in any direction, and for the way in which it allowed the use of any system of lenses.—Prof. Du Bois-Reymond spoke on the difficulty of determining the blood-pressure in the capillary vessels, and discussed the method he had adopted in his lectures for the presentation of correct views on this matter. As was known, the blood-pressure in the capillary vessels had hitherto been determined by placing a small glass plate on a spot of skin and then estimating the pressure that was necessary to render this spot void of blood. By this method, however, the elasticity of the inter-capillary tissues was left out of account, and the results were therefore vitiated, so far as the determination of the pressure in the capillaries was concerned. The exact state of the case, which it was difficult for any experimental examination to come at, was, in the first place, able to be determined only under ideal conditions. In the current of an incompressible and inexpansible fluid through a system of pipes under a given propelling force the rate of current was always in inverse proportion to the cross section, while, with the distance of the propelling force, the pressure abated at a rate proportionate to the resistance, *i.e.* it sank more rapidly in narrow, and more slowly in wide, tubes. If a tube were widened by splitting it into two branches of equal calibre, the proportions between lateral section, rate of current, and pressure remained the same. If, on the other hand, the bore became as large again as before, the rate of current sank to a half, while the pressure decreased but little. If, again, a capillary network were intercalated into the system of pipes, the rate of current fell only in proportion to the enlargement of the total cross section; the pressure, on the other hand, sank considerably on account of the resistance presented by the capillaries, and the curve of pressure showed a very steep decline in relation to the abscissæ of the zero-line. If the capillaries again merged into simple tubes, the cross section became less, the rate of current proportionally greater, while the pressure again sank but slowly. In the middle of the capillary system the pressure, in accordance with known laws, amounted to half the initial pressure. In the circulation of the blood the cross sections of only the larger arteries and veins were known; the cross section of the capillary system was unknown. Under the ideal conditions, however, which formed the basis of the above scheme this cross section might be calculated from measurable rates of current. Suppose the rate of current of the blood in the capillary vessels equal to 0·8 mm. per second, and that in the aorta equal to 500 mm. per second, then the current in the latter was 625 times as swift as that in the capillaries, and the cross section of the whole capillary system must be 625 times as large as that of the aorta, or the diameter of all the capillaries was twenty-five times as large as the diameter of the aorta. The curve of pressure sank slowly in the arterial system. In the capillaries the great resistance required a very considerable difference of pressure, and the curve of pressure sank, therefore, very considerably; to sink more slowly in the veins down to beneath the abscissa line, *i.e.* the pressure in the veins in the neighbourhood of the heart became negative. In the middle of the capillary system the pressure, in accordance with this view, was equal to half the pressure in the ventricle. Should the arteries in consequence of the contraction of their smooth muscle-fibres become narrower, the point where the pressure in the capillaries was equal to half the heart's pressure shifted nearer to the arterial system. If, on the other hand, contractions or obstructions occurred in the veins, this point came closer to the venous system. Such a presentation of the case gave a view of the conditions of cross section and pressure in the capillaries, and offered a basis for experimental investigations. A scheme of the same kind might be applied to the system of lymphatic vessels, for which the average pressure in the blood capillaries must be taken as starting pressure.—Prof. Fritsch related an optical phenomenon he had perceived during the microscopical examination of certain objects, a phenomenon he described as due to monocular stereoscopic vision. Certain pictures, in particular those of the transverse section of the principal nerves of the electric organ, made a decided impression of a funnel-shaped depression such as was otherwise obtained only in the binocular contemplation of the well-known stereoscopic figures. It was especially easy for him to receive this impression on moving his eye from side to side. By producing the arrangement he had referred to at the next sitting of the Society, he would ascertain whether other eyes received the same impression of the picture.

VIENNA

Imperial Academy of Sciences, December 4, 1884.—On the scientific usage of orthogonal axonometers, by C. Pelz.—On the mechanical theory of electricity, by T. Tanuschke.—On energy and coercive state in the magnetic field, by G. Adler.—On the consumption of some foods in the intestinal tract of man, by H. Malfatti.—Contribution to a knowledge of some hydroproducts of cinchoninic acid, by A. Weidel and K. Hazura.—On the action of the sun-spectrum on the haloid compounds of silver, and on the raising of their sensibility to some parts of the spectrum by colouring-matters and other substances, by T. M. Eder.—Computation of the orbit of the planet Russia 232, by N. Herz.

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